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Why Fruit Trees Fail to Bear

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WHY FRUIT TREES FAIL TO BEAR

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Many amateur fruit growers are concerned at times because their trees do not begin to bear as soon after being planted as they had expected or do not bear as abundantly as they wish. In some cases after bearing for a period of years the trees cease to produce, or bear irregularly.

There are many reasons why a fruit tree may not bear. Letters of inquiry addressed to the United States Department of Agriculture concerning such problems rarely contain sufficient information about the trees concerned, the treatment they have received, and their environment to make it possible to supply information specific enough to be helpful.

While sometimes the reason for a fruit tree not bearing may be obscure and not explainable on any known basis, in the majority of cases such failure is due to some one of several well recognized factors. The more common of these are here briefly discussed.

Age

Not infrequently people have a mistaken idea in regard to the age at which fruit trees of different kinds may be expected to bear. Standard apple trees east of the Rocky Mountains rarely bear very much before they are 6 or 7 years old (the age being reckoned from the time they are planted in the orchard). They perhaps tend to bear a little earlier west of the Rocky Mountains. The bearing age, however, varies considerably with different varieties. A few apple varieties may bear a little when they are 4 or 5 years old, and occasional trees of most varieties may bear a few fruits considerably in advance of the general run of the planting, but this means very little in terms of a crop. There are other varieties that are notoriously late in coming into bearing, the trees, as they are generally managed, perhaps not producing any more, relatively, when they are 10 or 12 or perhaps 14 years of age than do the majority of varieties when the trees are 6 or 8 years old. To what extent late bearing may be overcome by tree management is still problematic.

Pear trees come into bearing somewhat earlier than apple trees, but with most varieties there is likely to be very little fruit before the trees are 6 or 7 years of age. In the case of the Kieffer and one or two other closely related varieties, bearing may begin somewhat earlier, perhaps by the time the trees are 4 or 5 years old.

Peach trees under favorable conditions not infrequently bear when they are 3 years old. If weather and other conditions are favorable, a fairly good crop may be looked for the fourth year.

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Sour cherry trees come into bearing considerably earlier than do sweet cherry trees, being comparable with peach trees in this respect. Sweet cherry trees are likely not to bear much fruit before they are 5 to 7 years of age.

Plum trees vary considerably, depending on their type. The Japanese and native varieties will ordinarily bear under favorable conditions by the time the trees are 3 to 5 years of age. The European varieties, that is, those commonly referred to as "large blue plums," and prune trees rarely bear much before they are 5 or 6 years of age.

While the treatment that trees receive, the way they are managed, and to some extent the region where grown, all influence the time of bearing, the foregoing comments will be suggestive as to some of the ordinary limitations regarding the age of bearing. If trees are making a good thrifty growth and appear to be vigorous and healthy, no concern need be felt if they do not produce fruit before they are the age mentioned.

Sometimes trees fail to bear because of deterioration due to neglect, or because of old age. Such trees require treatment commonly referred to as "renovation." However, problems of this particular type rarely come within the scope of the inquiries which this leaflet is designed to answer.

Adverse Temperatures and Other Weather Conditions

If a frost occurs during the period when fruit trees are in bloom, injury frequently results therefrom, its seriousness depending on the severity of the frost and the attending conditions. The injury may range from the killing of a few abnormally weak or tender blossoms to the complete destruction of the entire crop prospects.

Frequently, when cold weather prevails at blossoming time, the fruit does not set well, even though the trees blossom abundantly and no killing frost occurs. The pollen does not germinate when the temperature approaches the freezing point. Probably there is little germination of the pollen if the temperature during the blossoming period continues much of the time below 40° or 42° F. Other essential parts of the blossom, including the pistil and ovules, may be adversely affected by low temperatures, so that should the pollen germinate, fertilization may not take place even though no actual freezing of the flower parts occurs. Sometimes the blossoms open during a warm period which is immediately followed by a cold spell that continues during the remainder of the blossoming period. Under such conditions a very poor set of fruit may be looked for. An exceedingly heavy June drop commonly follows a blossoming period such as has been described, continuing sometimes until practically the entire set of fruit is gone.

If a very heavy beating rain occurs immediately after the blossoms open, it may result in much of the pollen being washed away, especially in recently opened blossoms; this, at least, is a claim that is sometimes made.

Again, many fruit varieties are self-sterile or self-unfruitful, and the blossoms are dependent upon the pollen from other varieties to fertilize them. The common honeybee is the principal agent in carrying the pollen from one tree to another and from blossom to blossom. Bees are inactive during very windy weather, also when the temperature

drops to within 10° or so of freezing. If the blossoming period is so windy or the temperature so low that the bees are inactive, self-sterile varieties are likely to pass through the blossoming period without cross-pollination.

The temperature may operate adversely in still another way, particularly with respect to peaches and some of the other more tender fruits. It rarely occurs in the case of apples, although it may happen under extreme conditions. Reference is here made to the results of critically low temperatures which may occur during the winter period. For instance, peach buds even in a perfectly dormant condition are killed or injured by extreme temperatures. The most tender parts of the blossom are the pistil, or the small embryo fruit, which occupies the center of the flower. The temperature may be low enough during the winter to destroy these central parts of the flower in many of the buds. Where this occurs, such buds may open normally, and unless the blossoms are carefully examined to see whether the central parts of the flower are fresh and alive or brown and dead and withered, injury may not be suspected until it is found that the trees are not setting any fruit, or perhaps only a very light crop, although there was a profuse bloom. In the case of the more tender fruits this type of winter injury doubtless occurs many times without the growers being aware of it.

Again, injury due to extremely low temperatures may be so severe that the entire bud is killed. In that case the buds do not open in the spring. One unfamiliar with this occurrence may wonder why his trees do not blossom or why they do not produce fruit when apparently they were in excellent condition and earlier prospects for a crop were good.

Self-sterility or self-unfruitfulness

In a preceding paragraph reference was made to self-sterility or self-unfruitfulness. This prevails in many fruits, and means that the blossoms of a variety are not fertilized by the pollen of the same variety. In such cases, cross-pollination must be provided whereby the pollen of an entirely different variety of the same kind of fruit is made available.

Self-sterility is very common. It occurs in many varieties of apples, most varieties of pears, probably in all varieties of sweet cherries, in most if not all varieties of the native and Japanese plums, and in some varieties of the European or domestic plums and prunes. Sour cherries are considered largely self-fertile, although there is some evidence of partial self-sterility. Most peach varieties are self-fertile; the J. H. Hale and June Elberta (Mikado) are notable exceptions, as they require cross-pollination. Sterility in plums, cherries, and perhaps other fruits may sometimes be due to deformed or imperfect pistils. Some grape varieties must be cross-pollinated in order to be fruitful.

There is every conceivable degree of self-sterility, from one extreme where no fruit sets without cross-pollination to that where it is so slight as not to be a serious factor in fruit production. The opinion is commonly held that even the varieties considered to be self-fertile in a high degree will set a better crop of fruit if cross-pollination occurs. With self-sterility prevailing to so large an extent in the common fruit varieties, the relation of weather conditions favorable

to the greatest activity of honeybees becomes readily apparent, since it is on them that the fruit grower must depend very largely for the cross-pollination of his fruits.

In the planting of orchards it is of fundamental importance that the grower take into account the self-sterility problem in choosing his varieties and in so planting them that cross-pollination will be insured. Every third tree in every third row is usually regarded as a safe proportion for a minimum number of pollinizer trees. Undoubtedly there are many cases of low production in orchards due to self-sterility where the trees were planted before the existence of such a problem was fully appreciated. Many other cases occur where a home owner has planted a tree each of a number of different kinds of fruit in his yards or about his buildings. When self-sterile varieties are planted and there are no other trees of different varieties of the same kind growing near enough to insure the passing of bees from one to the other, it will be found that trees blossom but do not set fruit.

Where self-sterility occurs under such conditions as those described, the permanent remedy is to top-work a certain number of trees or branches to a variety that blossoms at the same time as the trees themselves and is known to be effective as a cross-pollinizer of the variety. This remedy, however, requires several years. A temporary expedient, which frequently proves quite effective, is as follows: When the tree to be cross-pollinated is in bloom, secure some blossoming branches from a tree of another variety of the same kind of fruit and place them in a pail or other water container in the top of the tree. The bees, visiting the trees, will also visit the blossoms on the branches and will thereby transfer the pollen as they revisit the blossoms on the tree.

Nutritional Condition of the Tree

The nutritional feature of nonfruitfulness is somewhat complicated. In general, trees that are overvigorous and those that are seriously lacking in vigor are not in a favorable condition of growth for the formation of fruit buds. There are many individual instances of trees bearing abundantly and at the same time making a very vigorous growth; also of trees that are weak and lacking in vigor bearing heavy crops; but such instances do not affect the general principles involved. In general, trees low in vigor need fertilizing in order to be fruitful. Not infrequently an apple tree blossoms freely but sets little or no fruit, even when weather conditions during the blossoming period are favorable. This may be due to an inadequate supply of nitrogen during the blossoming period. Where this is the case, about the time the buds begin to swell in the spring the application of 4 or 5 pounds, more or less, depending on the size of the tree, of nitrate of soda or some other readily available form of nitrogen will usually result in a good set of fruits that hold well to the tree.

The blossom buds of the common deciduous fruit trees form during the season preceding the spring when they open. It follows, therefore, that conditions in any season that affect the vitality or nutrition of a tree may affect correspondingly its next season's crop of fruit through their influence on fruit-bud differentiation. Adverse soil-moisture conditions, uncontrolled diseases or insects which may destroy or greatly reduce the normal functioning of the foliage, or the

production of an excessively heavy crop of fruit, with its effects on the storing up of plant foods within the tissues of the tree, may all be factors influencing the next season's crop.

Pruning in Relation to Production

Pruning may have a decided effect on productiveness. This is due, in part at least, to its effect on the nutritional condition of the tree. Excessive pruning of a young tree delays its bearing. This effect is especially marked with apple trees, but it is true also of other kinds. Instances are also known where apple trees 12 or 15 years old in reasonably satisfactory bearing condition have been very heavily pruned and the internal nutritional condition so thrown out of balance thereby that the trees have borne little or no fruit for several years thereafter. On the other hand, old trees that are somewhat lacking in vigor may be rejuvenated and stimulated into better fruit production by judicious pruning. Just what constitutes excessive pruning for a young tree or a judicious amount for an old tree of low vitality must be determined through experience under the local conditions. The tendency, however, is to overprune rather than to prune too lightly.

Dioecious Species

A few fruits—the persimmon is the most common example—are dioecious; that is, the blossoms that produce pollen and those from which fruits develop are borne on separate trees. Those that bear pollen-producing (staminate) blossoms are sterile and never bear fruit, but in planting a fruit-producing (pistillate) tree it is necessary to provide a staminate tree to pollinate the pistillate blossoms on the fruiting trees, unless there is a staminate tree growing nearby in the wild. The Tanenashi variety of Japanese persimmon is an exception, since seedless fruit will develop without pollination.

Other Reasons

There are other reasons why fruit trees fail to bear, including the weakening of the trees by disease or insect attack; in some cases the blossoms may be attacked by disease, such as fire blight in the apple and pear and brown rot in the peach and other stone fruits. Still other conditions may exist, but those that have been discussed or referred to are the more prevalent reasons for the failure of deciduous fruit trees to bear.

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